

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please cancel Claim 5.

4 Please amend Claims 1, 2, 4, 6, 9, 15, and 28; and add new Claims 29 and 30, as follows:

5 1. (Currently Amended) An automated sequential reaction system for automatically and  
6 sequentially producing a substance library of different desired chemical products from a plurality of  
7 reactants in accord with a programmed series of steps, comprising:

8 (a) a first automated reactant supply comprising a plurality of separate reactant  
9 chambers, each adapted to be filled with a different reactant;

10 (b) a first supply valve that is automatically actuatable and is connected to the first  
11 automated reactant supply to select a ~~first~~ desired first reactant from among the plurality of separate  
12 reactant chambers;

13 (c) a solvent supply, said solvent supply being configured to contain a solvent for  
14 flushing said automated sequential reaction system;

15 (d) a reaction module coupled in fluid communication with said first supply valve,  
16 such that a reactant chamber selected from within said automated reactant supply by the first supply  
17 valve is placed in fluid communication with said reaction module, said reaction module including a  
18 general purpose chemical reactor that is operable to produce the substance library of different desired  
19 chemical products from the plurality of reactants, ~~the general purpose reactor being configured to~~  
20 ~~operate continuously over a period of time, such that a volume of a desired product produced by the~~  
21 ~~general purpose reactor is a function of both a flow rate associated with the plurality of reactants~~  
22 ~~introduced into the general purpose reactor, and a length of time during which the plurality of~~  
23 ~~reactants are continuously introduced into the general purpose reactor, as opposed to a volume of a~~  
24 ~~reactor operating in a batch mode;~~

25 (de) an output valve that is automatically actuatable and is coupled in fluid  
26 communication with the reaction module to receive a desired chemical product, said desired chemical  
27 product contributing to the substance library of different desired chemical products;

28 (ef) an automated product collector in fluid communication with said output valve  
29 to receive the desired chemical product and comprising a plurality of product chambers, each product  
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1 chamber being adapted to be filled with a different desired product to produce the substance library  
2 of different desired chemical products; and

3 (fg) a system controller controllably connected to the first automated reactant  
4 supply, the first supply valve, ~~the reaction module~~, and the automated product collector, said system  
5 controller being programmed to monitor and control production of the plurality of desired chemical  
6 products by the automated sequential reaction system, ~~including controlling the first supply valve to~~  
7 ~~select the first desired reactant, controlling said reaction module to automatically produce the desired~~  
8 ~~chemical product from the first desired reactant, and controlling the output valve to select a product~~  
9 ~~chamber into which the desired product is directed~~ the system controller being configured to  
10 continuously operate the automated sequential reactant system over a period of time, during which  
11 the system controller implements the steps of:

12 (i) controlling the first automated reactant supply and the first supply  
13 valve to introduce a reactant required to produce a first desired product into the general purpose  
14 reactor for a period of time sufficient to produce a desired quantity of the first desired product;

15 (ii) controlling the solvent supply to flush the general purpose reactor with  
16 the solvent after the desired quantity of the first desired product has been produced; and

17 (iii) repeating steps (i) and (ii) with different reactants as necessary to  
18 produce each other desired chemical product needed to complete the substance library, such that a  
19 volume of solvent separates each different desired product discharged from the general purpose  
20 reactor, thereby achieving discharge of a continuous flow of fluid from the general purpose reactor  
21 during the period of time the automated sequential reaction system is operated continuously, the  
22 continuous flow comprising different desired products separated by a volume of the solvent.

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1           2. (Currently Amended) The automated sequential reaction system of Claim 1, wherein said  
2 ~~automated reactant supply further comprises a solvent supply, said solvent supply being adapted to be~~  
3 ~~filled with a solvent for flushing said sequential reaction system, said solvent supply being is~~  
4 selectively placed into fluid communication with the reaction module by the first supply valve under  
5 control of the system controller, to enable a solvent to flow from said solvent supply into said  
6 reaction module.

7           3. (Original) The automated sequential reaction system of Claim 2, wherein said automated  
8 product collector further comprises a spent solvent reservoir, said spent solvent reservoir being  
9 adapted to contain a spent solvent that has been used to flush said sequential reaction system, said  
10 spent solvent reservoir being selectively placed into fluid communication with the reaction module by  
11 the output valve under control of said system controller, to enable a spent solvent to flow from the  
12 reaction module into said spent solvent reservoir.

13           4. (Currently Amended) The automated sequential reaction system of Claim 1, ~~further~~  
14 ~~comprising a separate solvent supply that is selectively placed in fluid communication with said~~  
15 ~~reaction module by said first supply valve, under control of the system controller, to enable a solvent~~  
16 ~~to flow from said separate solvent supply into said reaction module~~ wherein the solvent supply is part  
17 of the first automated reactant supply.

18           5. (Canceled)

19           6. (Currently Amended) The automated sequential reaction system of ~~Claim 4~~ Claim 1,  
20 further comprising an automated detector disposed between the output valve and the reaction module  
21 and coupled to the system controller, said automated detector providing an output signal to the  
22 system controller that is indicative of whether a spent solvent or a desired chemical product is  
23 flowing from the reaction module, said system controller responding to the output signal to actuate  
24 the output valve to:

25               (a) selectively couple the reaction module in fluid communication with the  
26 automated product collector if the output signal indicates that a desired product is flowing from the  
27 reaction module; and

28               (b) selectively couple the reaction module in fluid communication with the spent  
29 solvent reservoir if the output signal indicates that a spent solvent is flowing from the reaction  
30 module.

1           7. (Previously Presented) The automated sequential reaction system of Claim 1, further  
2 comprising a heat exchanger controllably connected to said system controller, said heat exchanger  
3 being configured to enable the system controller to control a temperature within said reaction module.

4           8. (Original) The automated sequential reaction system of Claim 7, wherein said heat  
5 exchanger is disposed within said reaction module.

6           9. (Currently Amended) The automated sequential reaction system of Claim 1, further  
7 comprising a pump having an inlet in fluid communication with said supply valve, and an outlet  
8 coupled in fluid communication with an inlet to the chemical reactor, said pump being controllably  
9 connected to said system controller to enable control of a flow rate of a first desired reactant into the  
10 chemical reactor.

11           10. (Original) The automated sequential reaction system of Claim 1, wherein the reaction  
12 module includes a residence time chamber in fluid communication with an outlet of the chemical  
13 reactor, said residence time chamber providing additional time for a desired chemical product to be  
14 produced and having an outlet coupled in fluid communication with the output valve.

15           11. (Original) The automated sequential reaction system of Claim 1, wherein said chemical  
16 reactor comprises a microreactor.

17           12. (Original) The automated sequential reaction system of Claim 1, wherein said system  
18 controller includes a memory, a processor, and a user interface, said memory storing machine  
19 instructions that define the automated sequence of steps and which are executed by the processor to  
20 effect automatic control of the automated sequential reaction system.

21           13. (Previously Presented) The automated sequential reaction system of Claim 9, wherein  
22 said outlet valve comprises a proportional valve configured to act as a throttle to enable a pressure along  
23 a reaction path to be selectively varied.

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1           14. (Original) The automated sequential reaction system of Claim 1, further comprising a  
2 second supply valve, and a second automated reactant supply, said second automated reactant supply  
3 comprising a plurality of separate reactant chambers, each adapted to be filled with a different  
4 reactant, said second supply valve being automatically actuatable and connected to the second  
5 automated reactant supply to select a second desired reactant from among the plurality of separate  
6 reactant chambers included therein under control of said system controller, said first desired reactant  
7 and said second desired reactant being supplied to the reaction module to produce the desired  
8 product.

9           15. (Currently Amended) An automated sequential reaction system for sequentially  
10 producing a plurality of different chemical products using selected desired reactants from among a  
11 plurality of different reactants, comprising:

12               (a) a first automated fluid supply comprising a plurality of first separately  
13 addressable volumes that are selectively coupled in fluid communication with a first outlet, each  
14 volume being adapted to contain a different reactant;

15               (b) a second automated fluid supply comprising a plurality of second separately  
16 addressable volumes that are selectively coupled in fluid communication with a second outlet, each  
17 volume being adapted to contain a different reactant;

18               (c) a chemical reactor in fluid communication with said first outlet to receive a  
19 first desired reactant therefrom and with said second outlet to receive a second desired reactant  
20 therefrom, said chemical reactor being generally configured for sequentially producing the plurality  
21 of different chemical products by reacting successive different first and second desired reactants, ~~said~~  
22 ~~chemical reactor being configured to operate continuously over a period of time, such that a volume~~  
23 ~~of any specific chemical product produced by said chemical reactor is a function of both a flow rate~~  
24 ~~associated with specific reactants introduced into said chemical reactor in order to produce the~~  
25 ~~specific chemical product, and a length of time during which the specific reactants are continuously~~  
26 ~~introduced into said chemical reactor, as opposed to a volume of a reactor operating in a batch mode;~~

27               (d) a solvent supply adapted to contain a solvent and selectively provide the  
28 solvent to the chemical reactor for flushing the chemical reactor after each of the plurality of different  
29 chemical products has been produced thereby;

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1 (e) an automated fluid collector comprising a plurality of separate fluid volumes,  
2 each fluid volume being selectively coupled to the chemical reactor to receive a different chemical  
3 product therefrom;

4 (f) a spent solvent reservoir that is selectively coupled in fluid communication  
5 with the chemical reactor, to receive a spent solvent that was used for flushing the chemical reactor  
6 after each different desired chemical product has been produced thereby; and

7 (g) a system controller controllably connected to the first automated fluid supply,  
8 the second automated fluid supply, the solvent supply, the chemical reactor, the spent solvent  
9 reservoir, and the automated fluid collector, said system controller being programmed to ~~monitor and~~  
10 ~~control production of each of the plurality of different desired chemical products by the automated~~  
11 ~~sequential reaction system, including controlling the first automated fluid supply to select the first~~  
12 ~~desired reactant, controlling the second automated fluid supply to select the second desired reactant,~~  
13 ~~controlling the chemical reactor to automatically produce each successive different desired chemical~~  
14 ~~product from successive first and second desired reactants, controlling the automated fluid collector~~  
15 ~~to direct each different desired chemical product into a different fluid volume, and controlling the~~  
16 ~~solvent supply and the spent solvent reservoir so as to flush the chemical reactor after the production~~  
17 ~~of each different desired chemical product, and collect the spent solvent used to flush the chemical~~  
18 ~~reactor after the production of each different desired chemical product, such that the chemical reactor~~  
19 ~~is operated in a continuous mode as opposed to a batch mode, the controller establishing a flow rate~~  
20 ~~for each reactant introduced into the reactor, where the flow rate is selected based on a reaction time~~  
21 ~~required, where reactants are fed into the chemical reactor at a relatively higher flow rate to~~  
22 ~~accommodate reactions requiring a relatively short reaction time, and reactants are fed into the~~  
23 ~~chemical reactor at a relatively lower flow rate to accommodate reactions requiring a relatively~~  
24 ~~longer reaction time~~ continuously operate the automated sequential reactant system over a period of  
25 time, during which the system controller implements the steps of:

26 (i) controlling the first automated reactant supply, the first supply valve,  
27 the second automated reactant supply, and the second supply valve to introduce the reactants required  
28 to produce a first chemical product into the chemical reactor;

29 (ii) controlling the solvent supply to flush the chemical reactor with the  
30 solvent after the desired quantity of the first chemical product has been produced; and

1                   (iii) sequentially repeating steps (i) and (ii) using at least one different  
2 reactant in each subsequent sequence, to produce different chemical products, such that a volume of  
3 solvent separates each different chemical product discharged from the chemical reactor to produce  
4 the plurality of different chemical products, thereby achieving a continuous flow of fluid being  
5 discharged from the chemical reactor during the period of time the automated sequential reaction  
6 system is operated continuously, the continuous flow comprising different chemical products  
7 separated by a volume of the solvent.

8           16. (Original) The automated sequential reaction system of Claim 15, further comprising a  
9 pump in fluid communication with said first outlet of said first fluid supply, with said second outlet  
10 of said second fluid supply, and with said chemical reactor, said pump being controllably connected  
11 to said system controller, which controls a flow rate of the first and second desired reactants through  
12 said automated sequential reaction system with the pump.

13           17. (Original) The automated sequential reaction system of Claim 15, further comprising a  
14 residence time chamber in fluid communication with an outlet of said chemical reactor, said  
15 residence time chamber providing additional time for a chemical product to be produced and having  
16 an outlet coupled in fluid communication with the automated fluid collector and the spent solvent  
17 reservoir.

18           18. (Previously Presented) The automated sequential reaction system of Claim 15, further  
19 comprising a detector in fluid communication with an outlet of said reactor, said detector producing a  
20 signal indicative of the type of fluid being discharged, said detector being controllably connected to  
21 said system controller, said system controller directing a spent solvent to said spent solvent reservoir  
22 and a desired chemical product to said automated fluid collector.

23           19. (Previously Presented) The automated sequential reaction system of Claim 15, further  
24 comprising a heat exchanger controllably connected to said system controller, said heat exchanger  
25 being configured to enable the system controller to control a temperature within said chemical  
26 reactor.

27           Claims 20-27. (Canceled)

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1           28. (Currently Amended) An automated sequential reaction system for automatically and  
2 sequentially producing a substance library of different desired chemical products from a plurality of  
3 reactants in accord with a programmed series of steps, comprising:

4                   (a)     a first automated reactant supply comprising a plurality of separate reactant  
5 chambers, each adapted to be filled with a different reactant;

6                   (b)     a first supply valve that is automatically actuatable and is connected to the first  
7 automated reactant supply to select a first desired reactant from among the plurality of separate  
8 reactant chambers;

9                   (c)     a reaction module coupled in fluid communication with said first supply valve,  
10 such that a reactant chamber selected from within said automated reactant supply by the first supply  
11 valve is placed in fluid communication with said reaction module, said reaction module including a  
12 general purpose chemical reactor that is operable to produce the substance library of different desired  
13 chemical products from the plurality of reactants;

14                   (d)     an output valve that is automatically actuatable and is coupled in fluid  
15 communication with the reaction module to receive a desired chemical product, said desired chemical  
16 product contributing to the substance library of different desired chemical products;

17                   (e)     an automated product collector in fluid communication with said output valve  
18 to receive the desired chemical product and comprising a plurality of product chambers, each product  
19 chamber being adapted to be filled with a different desired product to produce the substance library  
20 of different desired chemical products;

21                   (f)     a system controller controllably connected to the first automated reactant  
22 supply, the first supply valve, the reaction module, and the automated product collector, said system  
23 controller being programmed to monitor and control production of the plurality of desired chemical  
24 products by the automated sequential reaction system, including controlling the first supply valve to  
25 select the first desired reactant, ~~controlling said reaction module to automatically produce the desired~~  
26 ~~chemical product from the first desired reactant~~, and controlling the output valve to select a product  
27 chamber into which the desired product is directed; and

28                   (g)     an automated detector disposed between the output valve and the reaction  
29 module and coupled to the system controller, said automated detector providing an output signal to  
30 the system controller that is indicative of whether a spent solvent or a desired chemical product is



1 flowing from the reaction module, said system controller responding to the output signal to actuate  
2 the output valve to:

3 (i) selectively couple the reaction module in fluid communication with the  
4 automated product collector if the output signal indicates that a desired product is flowing from the  
5 reaction module; and

6 (ii) selectively couple the reaction module in fluid communication with a  
7 spent solvent reservoir if the output signal indicates that a spent solvent is flowing from the reaction  
8 module.

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1           29. (New) An automated sequential reaction system for automatically and sequentially  
2 producing a substance library of different desired chemical products from a plurality of reactants in  
3 accord with a programmed series of steps, comprising:

4                   (a) a reactor configured to generate a desired chemical product from at least one  
5 reactant;

6                   (b) a first reactant delivery structure configured to selectively deliver one of a  
7 plurality of different first reactants to the reactor;

8                   (c) a solvent delivery structure configured to selectively deliver a solvent to the  
9 reactor, to enable the reactor to be flushed with the solvent; and

10                  (d) a system controller controllably connected to said first reactant delivery  
11 structure and said solvent delivery structure, the system controller being configured to continuously  
12 operate the automated sequential reactant system over a period of time, during which the system  
13 controller implements the steps of:

14                           (i) controlling the first reactant delivery structure to introduce a reactant  
15 required to produce a first desired product into the reactor for a period of time sufficient to produce a  
16 desired quantity of the first desired product;

17                           (ii) controlling the solvent delivery structure to flush the reactor with the  
18 solvent after the desired quantity of the first desired product has been produced; and

19                           (iii) repeating steps (i) and (ii) for each additional reactant required to  
20 produce an additional desired product, such that a volume of solvent separates each different desired  
21 product discharged from the reactor to produce the substance library of different desired chemical  
22 products, thereby discharging a continuous flow of fluid from the reactor during the period of time  
23 the automated sequential reaction system is operated continuously, the continuous flow of fluid  
24 comprising different desired products separated by the solvent.

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1           30. (New) An automated sequential reaction system for automatically and sequentially  
2 producing a substance library of different desired chemical products from a plurality of reactants in  
3 accord with a programmed series of steps, comprising:

4                   (a) a reactor configured to generate a desired chemical product from at least one  
5 reactant;

6                   (b) a heat exchanger configured to control temperature conditions within the  
7 reactor;

8                   (c) a first reactant delivery structure configured to selectively deliver one of a  
9 plurality of different first reactants to the reactor;

10                  (d) a solvent delivery structure configured to selectively deliver a solvent to the  
11 reactor, to enable the reactor to be flushed with the solvent; and

12                  (e) a system controller controllably connected to said first reactant delivery  
13 structure, said solvent delivery structure, and said heat exchanger, the system controller being  
14 configured to continuously operate the automated sequential reactant system over a period of time,  
15 during which the system controller sequentially implements the following steps in order to produce  
16 the substance library of different desired chemical products:

17                           (i) controlling the first reactant delivery structure to introduce a reactant  
18 required to produce a desired product into the reactor for a period of time sufficient to produce a  
19 desired quantity of the desired product;

20                           (ii) controlling the heat exchanger to control temperature conditions within  
21 the reactor to facilitate production of the desired product; and

22                           (iii) controlling the solvent delivery structure to flush the reactor with the  
23 solvent after the desired quantity of the desired product has been produced.